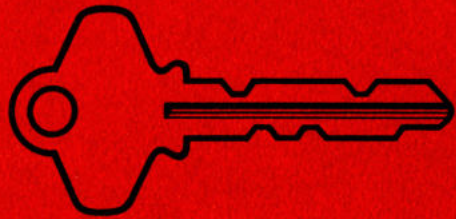


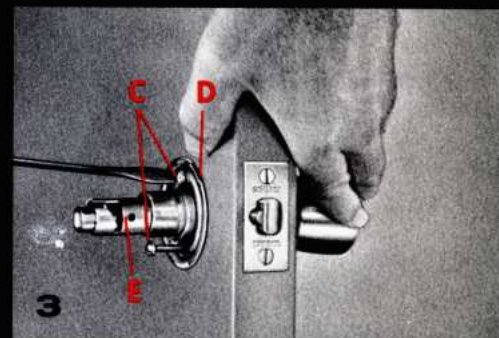
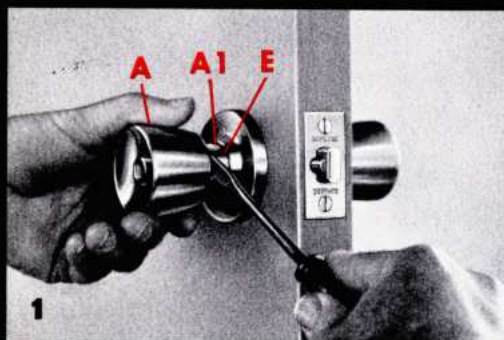
SCHLAGE
CYLINDRICAL LOCKS



KEYING
WAFFER
LOCKS

The Schlage wafer keyway unit, after years of research and development, was first marketed in 1927. Eleven hundred and twenty stock keys can be combined in this keyway and four hundred and eighty different changes are possible with a single master key. It can also be grand master keyed.

DISASSEMBLING AND REMOVING KEYWAY

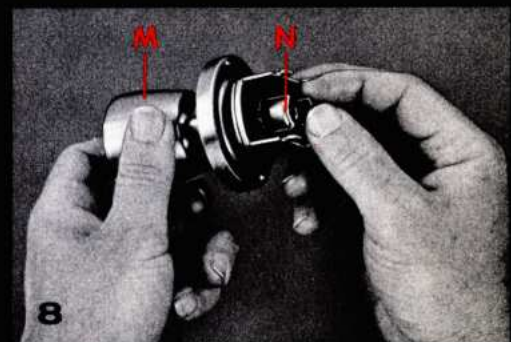
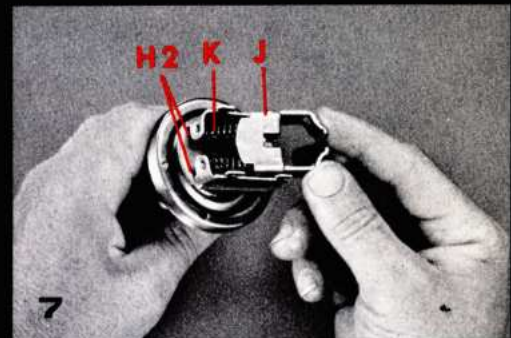
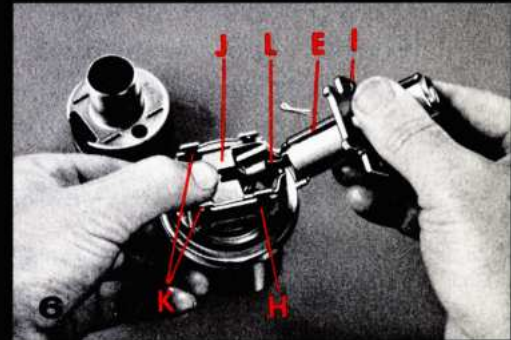


- Step 1** Depress catch (A1) through the hole in the shank of inside knob (A) with a screwdriver to release inside knob from spindle (E).
- Step 2** With knob removed, position screwdriver into small notch (B1) usually located on the bottom edge of inside rosette (B) and, with prying motion, snap off the inside rosette.
- Step 3** Remove the two machine screws (C) and inside mounting plate (D) will slip off over the inside spindle (E). The lock will now slip out of hole.

Step 4 The lock housing (F) is attached to the lock by small cotter pin (G) or by twisted lugs. Remove cotter pin (G) or straighten out the lugs. Lift housing above lugs and, with slight turn, rotate housing (F) $\frac{1}{4}$ inch and remove.

Step 5 With housing removed, the lock frame is now exposed. Hold lock in both hands, positioning fingers as shown in illustration. (When performing this operation, hold palms of hands carefully around lock to prevent springs from escaping the retractor slide.) To remove thrust plate (I), press forward with thumbs against frame tabs (H1), push upward with index fingers against thrust plate. This will disengage plate.

Step 6 In order to free the plunger unit (L) as you remove this assembly, it is necessary to push the slide (J) all the way to the rear against the compression of the two slide springs (K) and hold down on the slide with the thumb.



Step 7 After the inside spindle (E), thrust plate (I), and plunger assembly (L) have been removed, let the slide (J) and two slide springs (K) ease forward gradually and remove them from the lock frame (H).

Step 8 To remove wafer keyway unit (N) from lock, push in on face of the wafer keyway unit from the outside knob (M). Unit will then slide inward, where it can be removed from the knob assembly.

Step 9 To facilitate reassembly, remove outside knob (M) from lock frame by rotating knob $\frac{3}{4}$ of a turn while pulling out.

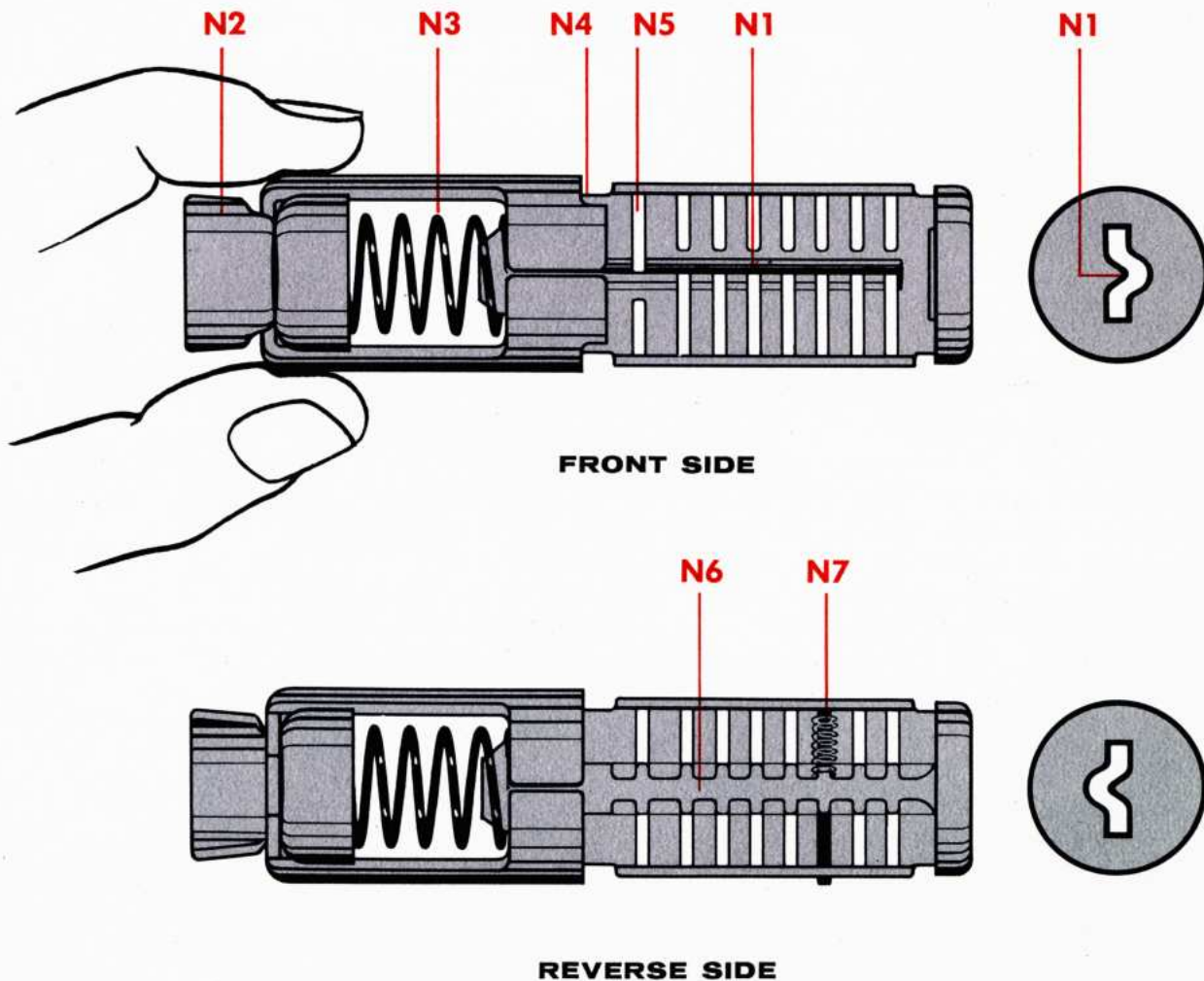
THE WAFER KEYWAY UNIT

Description and Terminology

In working with the wafer keyway unit, hold it in the left hand with the "V" grooved dividing strip (N1) facing you. In this position, the spring comb is on the underneath side and cannot be seen. The protrusion at the extreme left is the keyway cam (N2). The most common form of this cam is illustrated below. To the right is the plunger spring (N3). Next to this is the keyway frame (N4) which includes the entire steel area from the plunger spring to the finished cap of the keyway unit. In this steel framework are located the wafers which are activated by the insertion of the key.

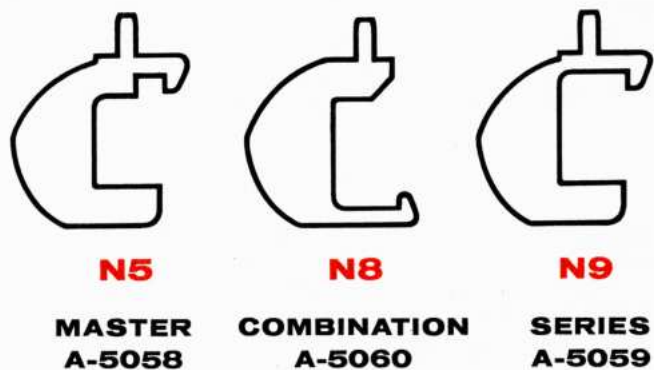
The first column (N5) to the right of the plunger spring, containing two slots is the location of the master wafer. Notice that the slots in this column have a different proportion than do the rest of the columns in the keyway frame. In the remaining columns, the top slot is shorter than the bottom slot in this particular unit. In some units, the relationship of these slots is reversed, the long on top and the short on bottom.

On the reverse side of the keyway unit, notice that there is a metal spring rack (N6) illustrated below, which looks like a comb and upon which are seated the wafer springs (N7).



WAFERS

To more easily recognize the three types of wafers, always arrange them so that the small protrusion is upward and the opening is to the right. Notice that each of the three types has a definite silhouette. The master wafer (N5) has a notch cut out at the base of the protrusion just inside of the spring seat. The combination wafer (N8) has a protrusion on the rounded shoulder opposite the spring seat location. The series wafer (N9) has the protrusion at the top of the wafer, close to the spring seat but does not have the small notch, as does the master wafer (N5). Each of these wafers performs in a different manner and it is most important to recognize each type before it is inserted in the keyway unit.



OPERATION OF THE KEYWAY UNIT

Here are two wafer keyway units set to the same combination. Figure 1 is in the relaxed position or with the key out of the keyway. Figure 2 has the proper key inserted. Notice in Figure 1, there are four protrusions of the wafers, one at the bottom and three at the top. The first protrusion to the right of the plunger spring (N3) is the master wafer (N5). This remains out except when it is retracted by the uncut portion of the tip of the key, which is designated in red. The cut portion of the tip is necessary to allow full insertion of the key into the keyway. The three protrusions (N9) at the top of the keyway are the series wafers. When the key is inserted, the uncut portion opposite the protrusion (indicated in red) acts upon the series wafers to pull them into the keyway.

The remaining four wafers (N8) in the keyway are combination wafers. Both in the relaxed position (Figure 1) and with the key inserted (Figure 2), these wafers lie within the confines of the keyway unit. Therefore, cuts on the key adjacent to their protrusion are required to prevent them from being pushed out into the locking position. An improper key will fail to draw back all the protrusions of the master and series wafers and will extend some or all of the protrusions on the combination wafers.

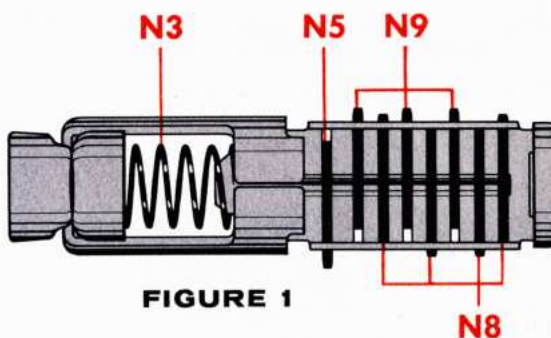


FIGURE 1

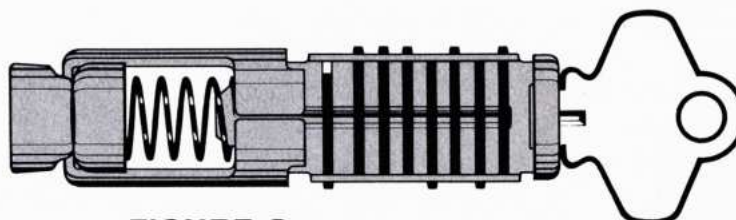
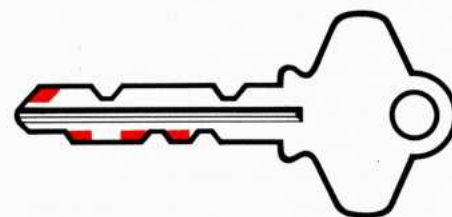
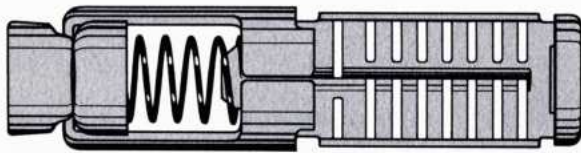


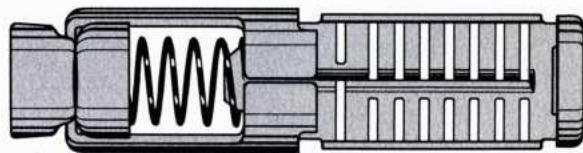
FIGURE 2

TYPES OF KEYWAY UNITS

Schlage wafer keyway units are made in two distinct types, type 1 and type 2. To distinguish between these two types, look first at the master wafer column. In type 1 the elongated slot will be at the top. Type 2 keyway has the elongated slot of the master wafer column below the "V" groove.



TYPE 1

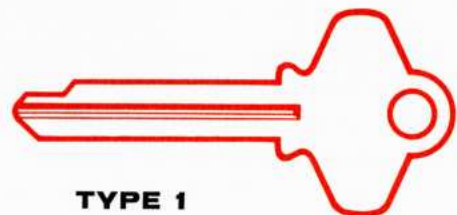


TYPE 2

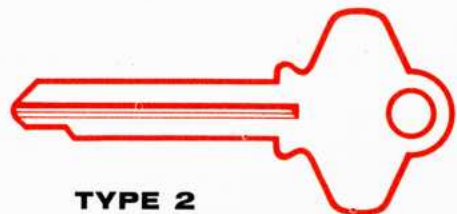
TYPES OF KEYS

As there are different types of keyways, there are also different types of keys.

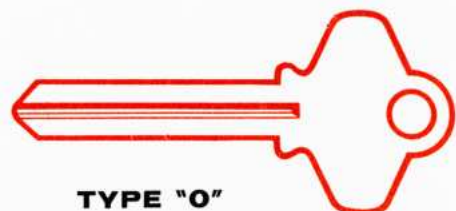
These can be recognized by looking at the tip to see which portion above or below the "V" groove has been cut away when the key is oriented with the "V" groove pointing away from you. If the portion above the "V" groove has been cut away, this is a type 1 key. If the portion below the "V" groove has been cut away it is a type 2 key. If the tip is uncut it is a type "O" key, usually used as a master or grand master key.



**TYPE 1
920A1**



**TYPE 2
920A2**



**TYPE "O"
920A**

KEYWAY CODING

As explained before, the first column to the right of the plunger spring is the master wafer column. Its proportions give a clue as to the type of keyway with which we are dealing. In illustration "A" at right, you notice the longer slot is below the "V" grooved dividing strip, indicating a type #2 keyway.

The 14 slots to the right of the master wafer column are assigned code numbers corresponding to the placement of the combination wafers (N8). The first slot to the right of the master wafer column and located above the dividing strip is given the designation code #1.

The slot directly below this is given the designation code #2. The code numbers alternate between odd and even, continuing to the right of the keyway. All odd numbers are on top—1, 3, 5, 7, 9 and the last two numbers are 1' and 3' (read as 1 prime and 3 prime). All the even numbers are located below the dividing strip—2, 4, 6, 8, 0—2' 4'.

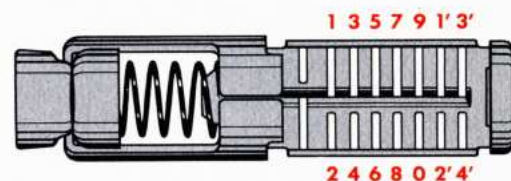
All factory cut keys have a combination number stamped on the bow which indicates the notching on the key.

In illustration "B" at the right, the key carried the number 203823. The first digit indicates a type #2 key with its tip cut away, as explained on page 6. The second digit, in this case 0, indicates a stock key not related to any masterkeyed system. The last four digits indicate the location of the notches cut in the key. These same four digits (3823 in the illustration) also indicate the position of the combination wafers in the keyway since these wafers must rest within the cut away portions of the key.

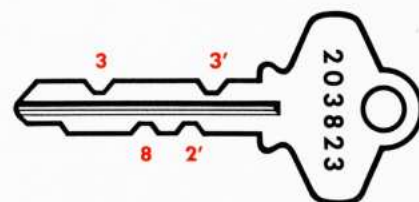
If a key is not stamped with a factory combination number, take an empty wafer keyway and insert the questionable key to determine its combination number. In illustration "C", at the right, the shank of the key may be seen through the slots in the keyway except at those code locations where the key has been notched.

Looking first at the master wafer column, the slot below the dividing strip is unobstructed indicating the tip of the key has been cut away at the bottom. This key is a type #2 (see p. 6). Therefore, the first digit of the combination number would be 2. The second digit of the code number is not related to any cuts on the key and is always 0 for stock (non-masterkeyed) keys. Other numbers are used as the second digit to designate masterkeyed systems, as explained on p. 13.

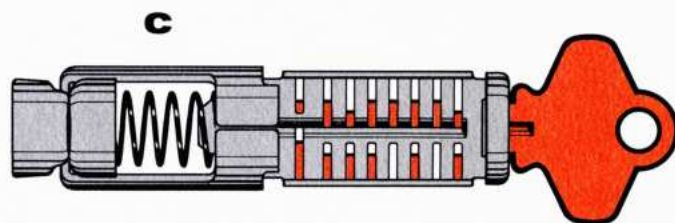
Next look at the 14 code slots in the remaining seven columns to locate the four cut away portions of the key. In illustration "C" at the right, these cuts occur at code positions 3, 8, 2', 3'. The complete combination number which would be stamped on this key should be 203823.



A



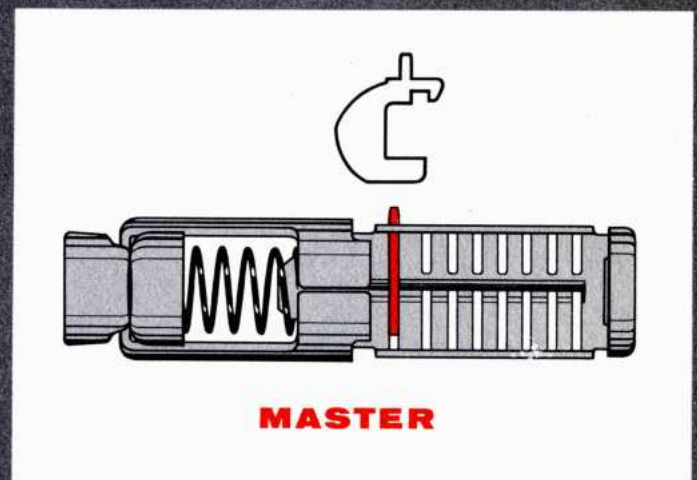
B



C

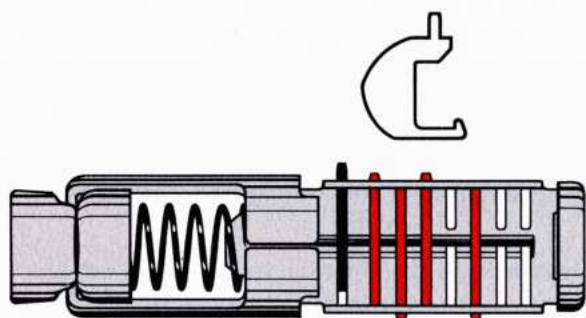
SETTING UP STOCK WAFER KEYWAY

Using the combination number 101450, the first digit designates a type #1 keyway. Select such a keyway and into this, insert a master wafer in the first or master column with the protrusion pointing up. The second digit being 0, indicates this will be a stock keyway unit and should be set up in accordance with the following procedure.

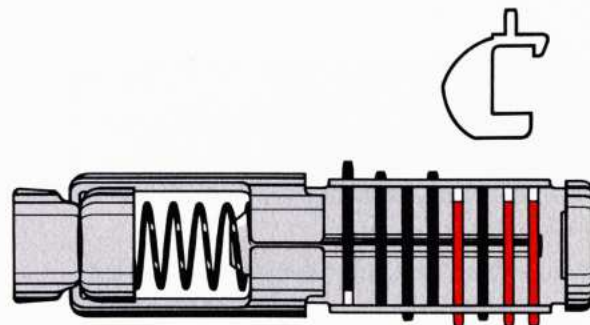


Taking four combination wafers, insert them in the positions indicated by the last four digits of the combination. The combination wafer is unique in that it may be inserted with the protrusion pointing either up or down in the seven combination columns. The code number designates in which of the 14 slots the protrusion should be inserted. For example, #1 would be inserted point-

UNITS BY COMBINATION NUMBERS



COMBINATION



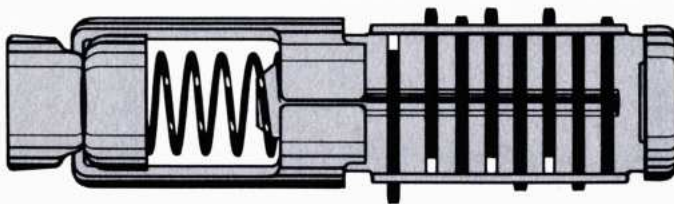
SERIES

ing upward in the first column after the master wafer column. #4 would point downward in the second column. #5 would be pointing upward in the third combination column and the 0 would be pointing downward in the fifth combination column. After the four combination wafers have been positioned, the remaining three empty columns should be filled with the series

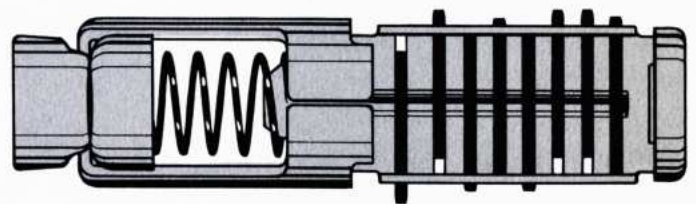
wafers. Note that the protrusion of the series wafers can be inserted only in the longer slot of the empty columns. The protrusion of all the series wafers, therefore, will point in the same direction within any one keyway. When springs have been properly attached to all wafers (see page 12), the keyway unit is then ready to be operated by a key cut to combination 101450.

KEYING ALIKE WAFER KEYWAY UNITS

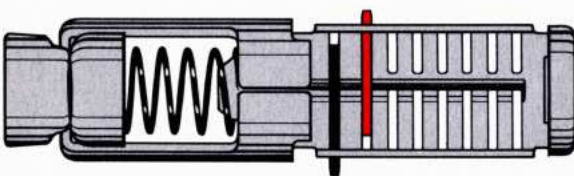
Frequently it becomes necessary to alter the combinations of one or more stock keyway units to exactly match that of another. The procedure used to accomplish this is termed "keying alike" and should not be confused with "masterkeying" which is discussed on page 13.



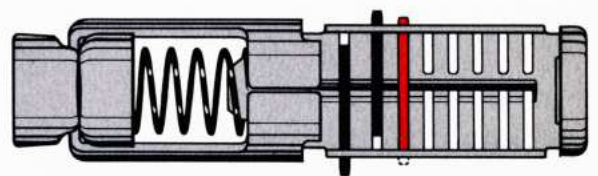
203823



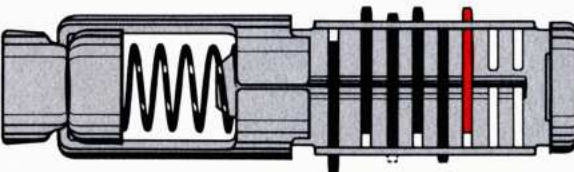
204583



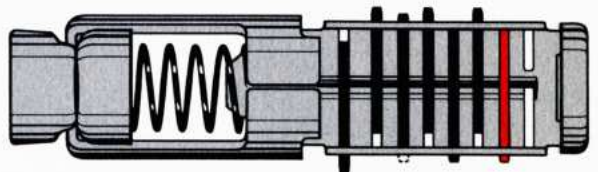
First Column—no change is necessary.



Second Column—invert combination wafer so that protrusion extends through the #3 code slot.

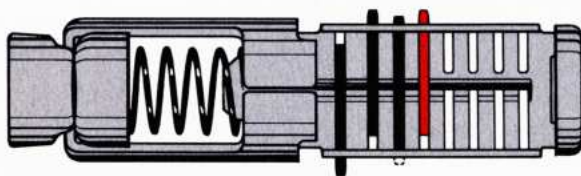


Fifth Column—no change is necessary.

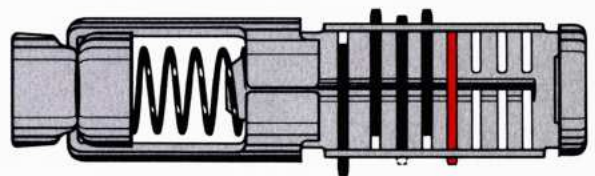


Sixth Column—replace series wafer with combination wafer — protrusion to extend through #2' code slot.

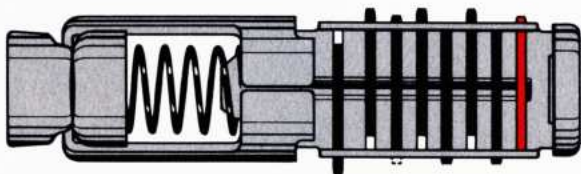
One of the simplest methods of keying alike a group of stock wafer keyway units of the same type, either type #1 or type #2, is to put one aside as a control, empty the series and combination wafers from the others, then "set up" these units to the code combination of the control keyway, using the procedure explained on pages 8 and 9. An alternate method involving fewer operations consists of rearranging only those series and combination wafers in the random keyways which differ in position from those located in the control keyway. Illustrating this method, we first select two keyway units of the same type—type #2 in this example. The keyway coded 203823 will be used as the control. Next, examine the seven combination columns to determine what rearrangement of the wafers is necessary to match the random keyway unit to the control keyway.



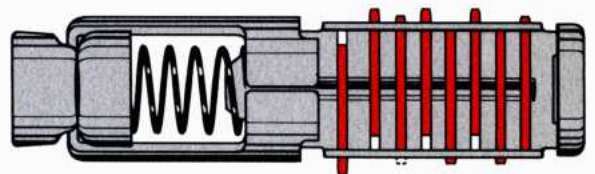
Third Column—replace combination wafer with the series wafer.



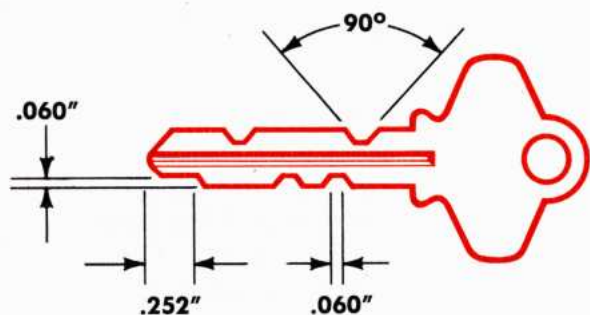
Fourth Column—no change is necessary.



Seventh Column—no change is necessary.



In this typical example, illustrating the alternate method of keying alike two keyway units, only three rearrangements of the wafers were necessary.



Keys accurately cut from genuine Schlage #920A key blanks insure smooth operation if the dimensions of the notching, as shown on the accompanying illustrations, are closely observed.

The first operation normally performed on a 920A key blank is to cut away a portion of the tip to correspond to the type of keyway unit with which it is to be used. (Note: key blanks may be purchased with this notch already cut by specifying 920A1 blanks for type #1 keyway units, or 920A2 blanks for type #2 keyway units.) All other cuts on the key are made to the same depth of .060" and have the same width .060" at the bottom of the notch. All of the angles in the cuts should have a minimum of 90 degrees.

It is best to use either a factory cut key as the basis for the duplicate, or full cut pattern keys available from the factory. With full cut pattern keys it is necessary to select only those notches corresponding to the specific combination numbers to be cut. After the keys are cut, dress them lightly with a file to remove sharp edges and check the keys in the keyway unit to make sure they operate properly. All the protrusions on the wafers should be flush with the keyway when the proper key is inserted.

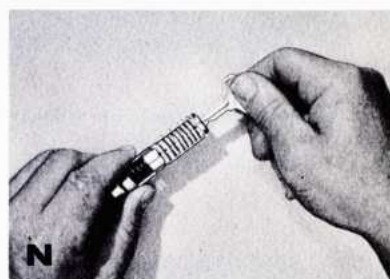
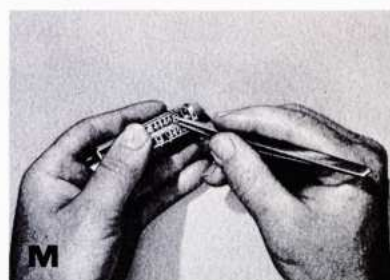
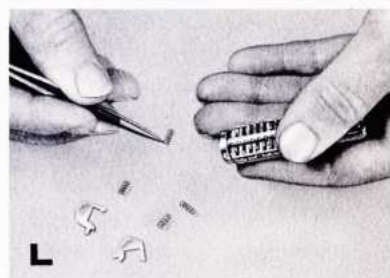
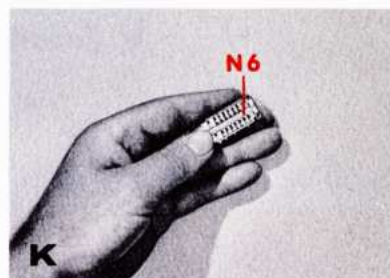
As in illustration "H", always hold the keyway unit in the left hand with the keyway cam (N2) to the left and the "V" grooved dividing strip facing you. Then as you insert the wafers (see "I") you will find the series wafers will only go in the elongated slot of the column. They should not be forced as they will not fit into the incorrect position. All wafers should be inserted in the slots with the protrusion first. This protrusion projects between the two side sections of the steel keyway frame.

When all of the wafers have been inserted into their proper location, hold the finished cap of the keyway unit with the right hand (see "J") and transfer the left hand so that the first two fingers cover the wafers and hold them in position as you rotate the keyway unit (see "K") to expose the spring rack (N6). If these wafers are not held in position as you rotate the keyway, they may drop out and cause you to rework the setup.

After the keyway unit has been rotated, hold it tightly against the fingers with pressure by the thumb and then exert force downward against the wafers with the index finger to open the distance between the spring rack in the center of the keyway and the spring seat on the wafers, to provide space for the insertion of the wafer springs.

The easiest way to insert a wafer spring is to use a pair of fine needle-nose tweezers (see "L") and grasp the spring at the second coil back from one end. Holding it in this position, you can guide the free end of the spring over the spring rack seat and use the needle-nose tweezers to guide the other end over the spring seat on the wafer.

When all springs have been inserted in the bottom of the keyway, exert pressure upward against the wafers with the middle finger and open the distance between the spring rack and the spring seat on the wafers. Again install the springs, as explained above (see "M"). Take the key (see "N") and run it in and out of the keyway several times as it is important that all springs are fully seated before the keyway unit is reassembled into the lock.



MASTERKEYING

Frequently it becomes necessary to provide a group of locks with keyway units, each having a different and non-interchangeable key, but all having in common one masterkey capable of operating each of the locks in the group.

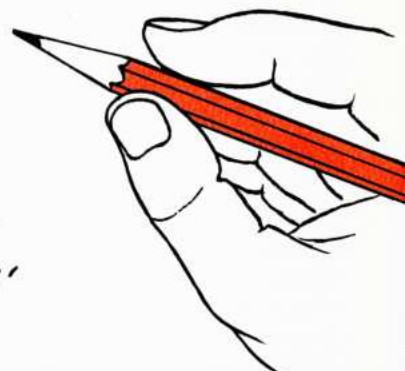
Combining locks in this manner is termed "masterkeying" and is quite easily accomplished with Schlage wafer keyway units. To illustrate the principle of masterkeying, consider first, two stock keyway units having combination numbers 203823 and 204823. These units, in common with all other stock keyway units, contain one master wafer, four combination wafers and three series wafers. Their code numbers indicate that these units are identical except for the position of the combination wafer in the second column. This difference is sufficient to prevent interchangeability of their keys but a third key could be cut which would operate both of these keyway units by providing it with notches for both the #3 and #4 combination tumbler positions. In other words, their masterkey would be cut with five notches corresponding to code positions 3, 4, 8, 2 and 3.

This principle of masterkeying can be expanded to include many more combinations. However, as the number increases, it will become necessary to eliminate one or two series wafers from the keyway units. Series wafers cannot be used in any column for which the key has been notched since it is the unnotched portion of the key which retracts the series wafer. At no time should a keyway unit be set up without any series wafers, as this decreases the security of the masterkey system.

One method of laying out a masterkeyed system involves five basic steps:

- Step 1** Select the required number of keyway units, all of which should be either type #1 or type #2. (If more than 240 keyway units are required, refer to page 18 under "Extended Masterkey Systems".)
- Step 2** Of the seven columns available, arbitrarily select either 3, 2 or at least 1 column which will be reserved in all keyway units for the placement of series wafers. 16 masterkeyed units are available with 3 columns reserved for series wafers. 80 masterkeyed units are available when 2 columns are reserved for series wafers. 240 masterkeyed units are available when 1 column is reserved for a series wafer.
- Step 3** List the code numbers of all the slots in the remaining columns. These slots are available for the placement of the four combination wafers. These code numbers also represent the cuts in the masterkey which will operate all the keyway units having combinations determined by the procedure given in step #4.
- Step 4** Utilizing the digits obtained in step #3, tabulate a list of four digit combination numbers. Although each column contains two code slots, it can accommodate only one wafer. Therefore, be careful to select not more than one digit from any available column.
- Step 5** Using the code numbers determined above, follow the procedure given on pages 8 and 9 and set up the masterkeyed keyway units, placing series wafers only in those columns reserved in step #2.

10 2360
10 3702'
10 1470
10 1360
10 1301'
10 2369
10 1391'
10 2469
10 1791'
10 172'4'



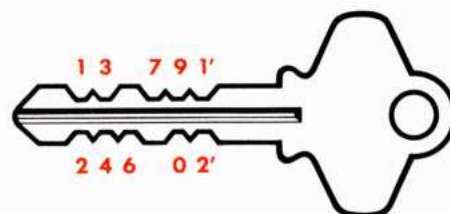
A

6 6 0 4 4 3 0

1 3 5 7 9 1' 3'
2 4 6 8 0 2' 4'

3 2 4 0 5 2 1

B



C

There is an alternate method of masterkeying which is particularly useful when there is at hand a number of assembled stock keyway units, or a supply of factory numbered stock keys.

The following seven basic steps illustrate this method:

- Step 1** Select approximately one-third more keys or keyway units (all of one type) than your anticipated needs and list their combination code numbers as illustrated to the left. (Illustration A).
- Step 2** In this method, only one series wafer is used, so in order to determine which column should be reserved for its placement to best utilize the maximum number of listed keys or keyway units, represent the keyway unit by drawing a rectangle and indicate the 14 slots by writing in their appropriate code numbers (see illustration B).
- Step 3** Above and below the rectangle and opposite each slot code number, write the figure which indicates the frequency of occurrence of the particular code number in the list of combinations (see illustration B).
- Step 4** Mentally add the two figures in each column outside the rectangle obtained in step #3 and determine the column having the lowest sum. This column will be the best location for the placement of a series wafer in all keyways selected to be masterkeyed. In the illustration B, the 7th column with a sum of one is the most desirable location for the series wafer.
- Step 5** Review the list of combination code numbers and strike out as impractical all combinations which contain digits corresponding to code slots which are located in the column selected in step #4. In the illustration, a combination 101724 would be eliminated since it contains the digit 4', the code slot for which is in the 7th column.
- Step 6** The required quantity of keyway units to be masterkeyed should now be selected from the remaining group of combination code numbers. Remove from each of these selected units, the two series wafers which are not located in the column reserved in step #4. Each of these keyway units may still be operated by its own key, but now, in addition, they all can be operated by a masterkey.
- Step 7** The masterkey which will operate these units is made by notching the key only at each location where a combination code number occurs. The remainder of the key must be left unnotched. In the illustration C, the masterkey would be notched at combination code locations 1, 2, 3, 4, 6, 7, 9, 0, 1', 2'.

MASTERKEY STAMPING

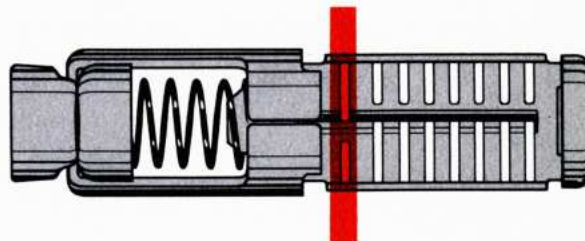
Some specific designation, such as the letter "M", should be stamped on the bow of the masterkey. Factory cut masterkeys are stamped with a registry number prefixed with the letter "R". This number is an index to the factory records which contain detailed information, such as the job name, location and the combinations controlled by this masterkey. Factory cut change keys which operate the individual keyway units in a masterkeyed system are stamped with a combination number. This number has the same meaning as that stamped on stock keys (see page #7).

The 2nd digit, always "0" on stock keys, now assumes the number of the column in the keyway which contains the series wafer. Stock keys whose keyway units have been converted into masterkeyed units should reflect this change by overstamping the 2nd digit with the appropriate number 1 through 7.

Occasionally it becomes necessary to provide two or more groups of masterkeyed keyway units with each group having its own masterkey and, in addition, a key called a grand masterkey which would operate the keyway units in all the groups. One method of laying out a grand masterkey system involves seven basic steps.

- Step 1** Select either type #1 or type #2 keyway with which to build the system.
- Step 2** Of the seven columns available, arbitrarily select one column which will be reserved in all keyway units for a series wafer.
- Step 3** If only two masterkeyed groups are desired under the grand masterkey, arbitrarily select another column which will provide two slots, each of which will be assigned exclusively to a masterkeyed group and is the means for separating the two groups and preventing interchangeability of their keys.
- Step 4** List the code numbers of the slots in the remaining five columns.
- Step 5** Tabulate a list of four digit combination numbers, each of which must contain one of the unique slot code numbers selected in step #3. The remaining three digits may be drawn from the available code numbers obtained in step #4, but remembering to select not more than one digit from any one available column. This list of combination numbers represents one masterkeyed group.
- Step 6** Repeat step #5. However, substitute the other unique slot code number for the one previously used. This list of combination numbers represents the second masterkeyed group. While these two groups may appear similar, their masterkeys are not interchangeable since one will not have the notch which is necessary to operate that combination wafer which is used exclusively in the other group.
- Step 7** The grand masterkey has all of the notches found on both masterkeys and will, therefore, operate all of the keyway units in both groups. This illustration represents but one of a large variety of possible grand masterkeying arrangements. More complex systems or those involving a greater number of masterkeys should be referred to the factory.

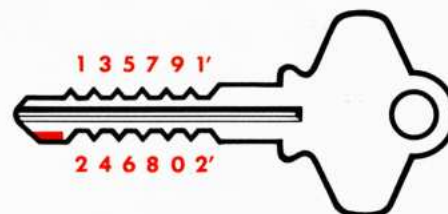
STEP 1



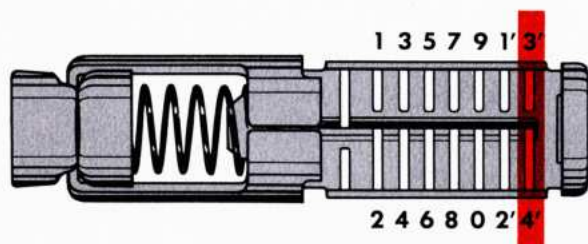
TYPE 1 KEYWAY

GRAND

STEP 7

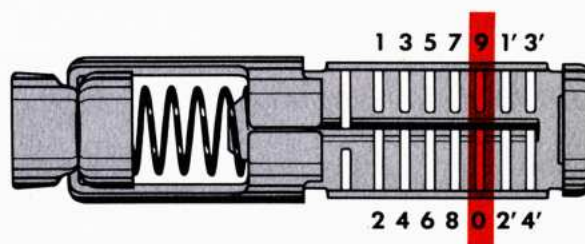


STEP 2



**SEVENTH COLUMN RESERVED
FOR SERIES WAFERS**

STEP 3



**ONE SLOT IN THIS COLUMN
RESERVED FOR EACH
MASTERKEYED GROUP**

MASTERKEYING

STEP 4

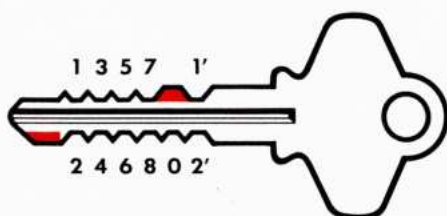
1 2 3 4 5 6 7 8 1' 2'

STEP 6

SECOND MASTERKEYED GROUP

1350	3570
1360	3580
1370	3501'
1380	3502'
1301'	4570
1302'	4580
2350	4501'
2360	4502'
2370	4701'
2380	4702'
2301'	5701'
2302'	5702'

Etc. Continuing To a
Maximum of 80 Combinations

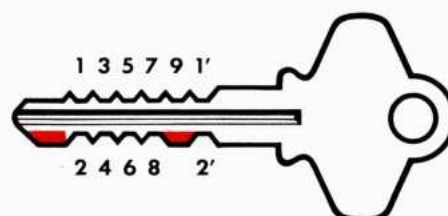


STEP 5

FIRST MASTERKEYED GROUP

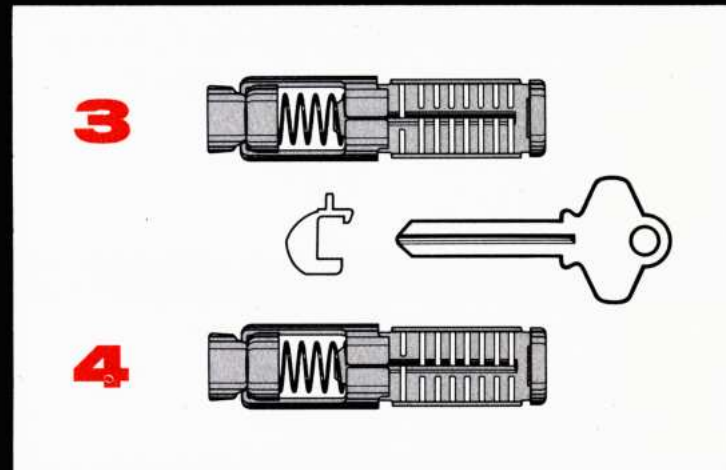
1359	3579
1369	3589
1379	3591'
1389	3592'
1391'	4579
1392'	4589
2359	4591'
2369	4592'
2379	4791'
2389	4792'
2391'	5791'
2392'	5792'

Etc. Continuing To a
Maximum of 80 Combinations

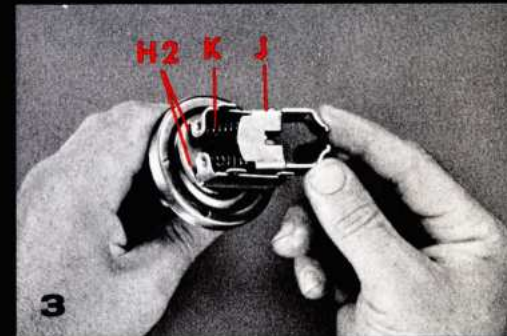
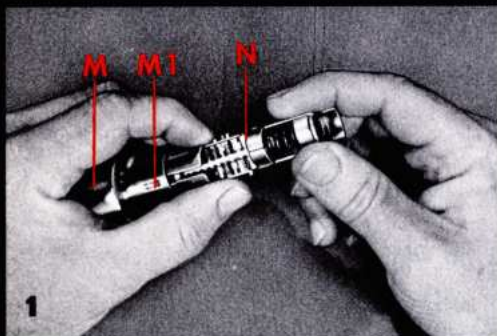


EXTENDED MASTERKEYED AND GRAND MASTERKEYED SYSTEMS

Masterkeyed or grand masterkeyed systems may be doubled simply by utilizing both type keyways (type #1 and type #2) and providing a key capable of operating both. In such an extended system all keyways must be provided with a series wafer in the master column. This does not, in any way, impair the operation of any existing keys. However, it does make possible the use of an additional key (type "0"—see page #6) capable of acting as a master, grandmaster or great grandmaster key. When a type #1 keyway unit is set up with a series wafer replacing the master wafer, both the keyway unit and its key are redesignated as type #3. Similarly, a type #2 keyway unit and its key are redesignated as #4.



REASSEMBLING LOCK MECHANISM

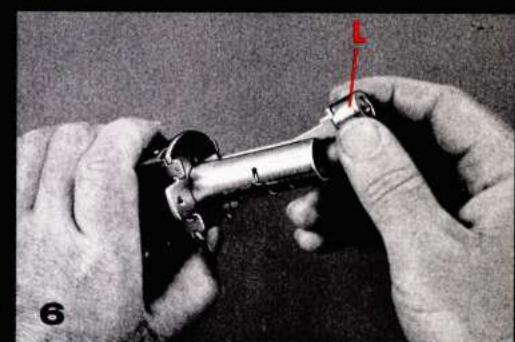
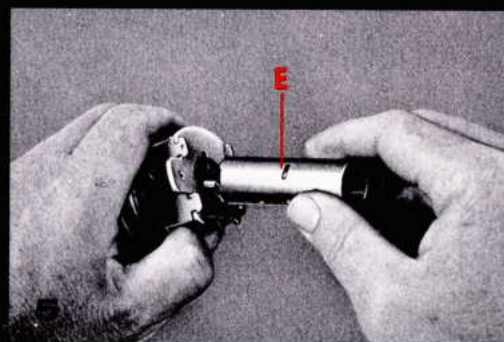
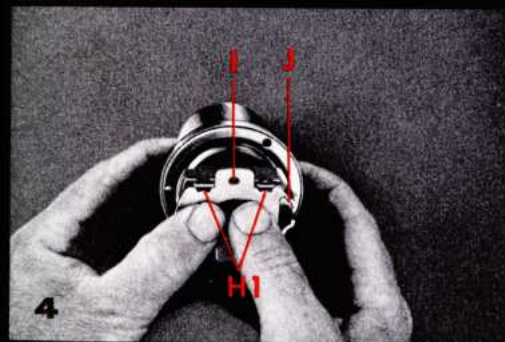


Step 1 Grasp wafer keyway unit (N) in right hand. In other hand, hold outside knob (M) with slot (M1) facing you. Insert wafer keyway unit (N) into outside knob spindle, aligning keyway cam as illustrated in figure #1. Depress wafer protrusions between thumb and forefinger while pushing in the keyway unit until it is bottomed.

Step 2 Insert knob through outside rosette and frame, pushing and rotating simultaneously until fully assembled. The keyway cam and spindle ears should be positioned at the open end of the lock frame.

Step 3 Place springs (K) into the slide (J) and assemble both into the frame locating the free ends of the springs on the ears (H2) of the lock frame. Be sure the bridge of the slide is facing you, as illustrated.

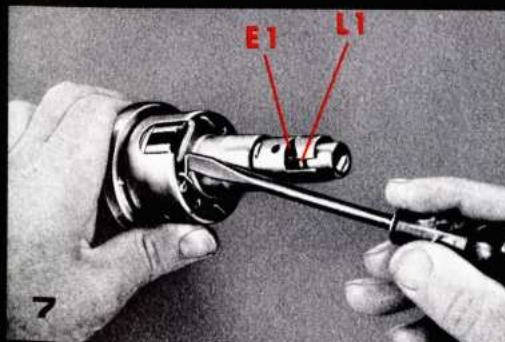
Step 4 Replace thrust plate (I) with its curved side over the springs (K) by inserting the bottom side between the bottom tabs of the lock frame and by pressing down snap into position between top tabs (H1).



Step 5 With the thumb depress the slide all the way back against the spring tension. Insert empty spindle (E) as illustrated. Release slide and spindle will lock into position.

Step 6 Slip plunger (L) inside empty spindle, making sure that the tab (L1) on turn button aligns with locking slot (E1). Again depress the slide and work plunger in all the way. Release slide and the plunger will lock into position.

Step 7 Replace housing over lock assembly with its opening in line with the jaws of the slide and replace cotter pin. Lock is now ready for installation in the door.



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